CHAPTER 4
INSTALLATION OF PGS
LESSON PLAN 4

METHOD:

Conference, demonstration, and practical exercise

TIME ALLOTTED:

3.0 hours

COURSE PRESENTED TO:

a. BFV crews
b. Instructors
c. TSC personnel

TOOLS, EQUIPMENT, AND MATERIALS (Per Vehicle Crew):

a. M2/M3 BFV with BII
b. One PGS set
c. TM 9-6920-710-12&P-1

PERSONNEL:

a. Primary instructor
b. Assistant instructor

INSTRUCTIONAL AIDS:

a. Overhead projector
b. Viewgraphs (Appendix C)

REFERENCES:

a. TM 9-6920-710-12&P-1, Chapter 2
b. TM 9-2350-252-10-1/2
c. TM 9-2350-284-10-1/2

APPENDICES:

Appendix A. Safety
Appendix B. Test Administration Guide
Appendix C. Viewgraphs

4-1. INTRODUCTION. (5 minutes)

Note. Show Slide 1.

a. **Reason.** PGS is designed for quick and easy installation. To use PGS to its full potential, you must be able to correctly and safely install the system on the BFV.

Note. Show Slide 2.

b. **Training Objective.** Given an operational M2/M3 with BII, and with prepare-to-fire checks, boresighting, vehicle preparation, and PGS PMCS completed, the crew will properly install PGS IAW TM 9-6920-710-12&P-1, Chapter 2.

c. **Procedure.** During this block of instruction we will cover the installation of a PGS set in preparation for training. You will have an assistant (small group) instructor for the practical exercise portion of this class. After completion of training, you will be evaluated on your ability to install selected PGS components. You will use the appropriate TMs to install PGS.

4-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE. (160 minutes)

Notes.
1. The primary instructor now releases the student crews to their assigned assistant (small group) instructor for the practical exercise portion of this lesson.
2. Prior to students' arrival, ensure that an assistant instructor is assigned to each training station.
3. Direct students to their appropriate training station.
4. Each assistant instructor is to conduct a safety briefing for his small group IAW Appendix A.
5. Whenever possible, have the students serve as demonstrators during small group instruction. Have one student read the procedures while another student performs the task. To ensure all students get equal hands-on time, rotate the reading and performance responsibilities.
6. The assistant instructor discusses and clarifies the procedures as required and reinforces the training objective.

Warning. Ensure turret traverse lock is engaged before installing PGS or entering turret.

Warning. Ensure vehicle master power switch and turret power switch are in OFF position before installing PGS.

Note. Instructor reminds students of importance of having already completed prepare-to-fire checks, boresighting, vehicle preparation, and PGS PMCS.

a. **PGS Installation Tasks.** Working as a crew, you will install PGS on a BFV IAW TM 9-6920-710-12&P-1. Installation tasks include:

4-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE (Con't).

(1) Installation of exterior components
(2) Installation of interior components
(3) Installation of interior cables
(4) Installation of exterior cables
(5) Verification of installation

b. **Installation of Exterior Components.**

(1) **Transceiver assembly (25 mm gun).**

Caution. Ensure transceiver unit locking handle is in locked position before lifting transceiver assembly from storage case.

(a) Place transceiver assembly over end of 25 mm gun barrel and position on top of rotor extension.
(b) Align transceiver assembly vertically with arrow on 25 mm gun barrel and secure with locking handle and strap.

(2) **Transceiver unit (TOW launcher) (if required for training).**

Note. Use 7/16 in. socket and wrench from BFV BII.

(a) Remove two screws and washers from TOW launcher.
(b) Install TOW transceiver unit mounting bracket on TOW launcher with two washers and screws.
(c) Remove transceiver unit from mounting bracket for 25 mm gun.
(d) Lift locking handle and install transceiver unit to mounting bracket with lens end of transceiver unit facing forward.
(e) Rotate transceiver unit in bracket until aligned with line mark on mounting bracket.
(f) Push locking handle up to locked position.

(3) **Retro detector assembly (right- and left-front).**

(a) Lift retro detector assembly locking handle and position retro detector assembly on turret lifting eye.
(b) On right side, push locking handle down to locked position. On left side, push locking handle up to locked position.

(4) **Hull defilade detector assembly (right- and left-front).**

(a) Position hull defilade detector assembly between two lower tubes of smoke grenade launcher and secure with retaining strap.

Caution. Ensure cable is routed without slack. DO NOT leave a loop in cable that can become snagged when turret is rotated.

Note. Right-front cable may need to be routed under 240 coax rain cover. Use 14 mm socket from BII.

(b) Route cable between smoke grenade launcher tubes up to retro detector assembly.

Notes. 1. The hull defilade detector unit cable uses a push/pull type connector, not the MIL-STD connectors found on the vehicle.
2. Demonstrate to the crew how to connect and disconnect the push/pull connector.

(c) Connect hull defilade detector assembly cable connector J2 to retro detector assembly connector J2.

(5) **Target computer/rear retro detector assembly.**

(a) Position target computer/rear retro detector assembly on turret center support on inside of rear turret bustle rack.
(b) Push locking handle down to lock.

(6) **Remote system interface (RSI) assembly.**

(a) Position RSI assembly in ammunition box storage bracket (third from left).
(b) Loop retaining strap around ammunition box storage bracket.

(7) **Global position sensor (GPS) antenna assembly.**

(a) Lift locking handle and position GPS antenna assembly on rear of vehicle antenna protective guard located on right side of turret.
(b) Push locking handle down to locked position.
(c) Route GPS antenna cable along turret wall to RSI assembly.
(d) Lift RSI assembly from ammunition box storage bracket and connect GPS antenna cable to RSI unit connector J3. Lower RSI assembly.

(8) **Hull defilade detector assembly (right- and left-rear).**

(a) Position hull defilade detector assembly to lower forward corner of turret bustle rack.
(b) Push locking handle down to lock.

4-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE (Con't).

Caution. Ensure cable is routed without slack. DO NOT leave a loop in cable that can become snagged when turret is rotated.

Note. Perform step (c) for right-rear hull defilade detector assembly cable routing.

(c) Route cable outside of turret, just in front of turret bustle rack and into turret bustle rack.

Note. Perform step (d) for left-rear hull defilade detector assembly cable routing.

(d) Route cable through drain hole in bottom of turret bustle rack.

Notes. 1. The hull defilade detector unit cable uses a push/pull type connector, not the MIL-STD connectors found on the vehicle.

2. Demonstrate to the crew how to connect and disconnect the push/pull connector.

(e) Connect hull defilade detector assembly cable connector J2 to retro detector assembly connector J2.

c. **Installation of Interior Components.**

(1) **TBOS gunner's eyepiece unit.**

(a) Remove pin, brow pad, and rubber eye cushion from gunner's sight.
(b) Release locking handle and position TBOS eyepiece unit in front of gunner's sight.
(c) Rotate TBOS eyepiece unit to accommodate left or right eye. This is done by releasing the spring-loaded locking pin and rotating locking collar until new position is found.
(d) Install TBOS eyepiece unit on sight.
(e) Secure TBOS eyepiece unit to sight with locking handle.
(f) Install replacement brow pad on gunner's sight with pin.

(2) **TBOS commander's eyepiece unit.**

(a) Remove pin, brow pad, and rubber eye cushion from commander's sight.
(b) Release locking handle and position TBOS eyepiece unit in front of commander's sight.
(c) Rotate TBOS eyepiece unit to accommodate left or right eye. This is done by releasing the spring-loaded locking pin and rotating locking collar until new position is found.

Caution. Eyepiece shield must be installed to protect eyepiece unit from being stepped on.

4-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE (Con't).

(d) Install eyepiece shield and TBOS eyepiece unit on sight.

(e) Secure TBOS eyepiece unit to sight with locking handle.
(f) Install replacement brow pad on commander's sight with pin.

(3) **Shorting plug.**

(a) Open 25 mm gun guard.
(b) Open 25 mm gun cover.
(c) Disconnect vehicle connector from 25 mm gun.
(d) Connect shorting plug to vehicle connector.
(e) Use velcro strap to secure shorting plug to gun.
(f) Close 25 mm gun cover.
(g) Close 25 mm gun guard.

(4) **LOW AMMO light covers.**

(a) Install HE light cover over reflector on HE ammo can door.
(b) Insert AP light cover between AP low ammo sensor and AP ammo can.
(c) Fold and insert COAX light cover between COAX ammo boxes.

(5) **Vehicle interface assembly.**

(a) If installed, remove four screws, lockwashers, and floor plate from floor of vehicle.
(b) Position vehicle interface assembly on vehicle floor between two rows of DTP connectors with all cables loosely coiled on top of assembly

d. **Installation of Interior Cables.**

Caution. Do not step on vehicle interface assembly during cable installation.

Note. Once installed, ensure that each cable is secured with velcro straps.

(1) **W10 cable.**

Caution. Inspect DTP connectors for dirt and bent or damaged pins. If necessary, clean connector threads. Dirt can obstruct the connection of PGS cables and cause damage to connectors.

(a) Connect W10 cable connector J2 to DTP connector J2.
(b) Route cable W10 upward around tool case, under turret control box, to turret position indicator, and behind coax ammo doors to intercom.
(c) Connect two wires of W10 cable to two amplifier terminals of intercom.

(d) Connect W10 ground wire to intercom with washer and nut.

(e) Disconnect vehicle cable connector J1 from connector J1 at rear of turret position indicator.
(f) Connect W10 cable connector J1 to turret position indicator connector J1.
(g) Connect vehicle cable connector J1 to W10 cable connector J1.

(2) **W9 cable.**

Note. DTP J3 and DTP J4 use the same type of cable connector. Do not switch cable connectors during installation.

(a) Connect W9 cable connector J3 to DTP connector J3.
(b) Connect W9 cable connector J4 to DTP connector J4.

(3) **Control panel and TDRS memory card.**

(a) Connect control panel cable connector J1 to vehicle interface unit connector J1. Vehicle interface unit is mounted on vehicle interface bracket.
(b) Install TDRS memory card in control panel.
(c) Route control panel cable upward, around tool case to right side of turret.

Note. The basic versions of the M2/M3 use control panel bracket (PN 8839 116-111) to secure control panel to 7.62 mm ammo can. Position bracket over edge of can and secure control panel to bracket using control panel magnets.

(d) Install control panel on coax ammo can. Magnets secure control panel to coax ammo can.

Warning. Ensure vehicle master power switch is in OFF position before connecting W11 cable.

(4) **W11 cable.** Connect W11 cable connector to DTP connector J1.

(5) **W7 cable.**

(a) Route W7 cable upward around tool case to the weapon control box. Route cable along top of box and up along left side of 25 mm gun guard to gunner's sight.
(b) Connect W7 cable connector J1 to connector J1 of TBOS gunner's eyepiece unit.

4-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE (Con't).

(6) **W8 cable.**

(a) Route W8 cable upward, around tool case, along right side of 25 mm gun guard, along turret roof to commander's sight.

(b) Remove pin and pull replacement brow pad outward to expose connector J1 of TBOS commander's unit.
(c) Connect W8 cable connector J1 to connector J1 of TBOS commander's eyepiece unit.
(d) Install replacement brow pad with pin.

(7) **Replacement floor plate.**

(a) Position replacement floor plate on floor of vehicle with cable cut-out facing right front. Ensure that five cables extend out through cut-out.
(b) Install four lockwashers and screws.

(8) **W2 cable.**

(a) Route W2 cable upward, around tool case, under turret control box, past commander's TPI, and behind coax ammo cans.
(b) Route W2 cable up through periscope hole.
(c) Position W2 cable through slot and into smaller hole in grommet.
(d) Install grommet in turret.
(e) To connect cables to the target computer unit, loosen target computer/rear retro detector assembly mounting on turret center support.
(f) From outside turret, connect W2 cable connector J1 to RSI unit connector J1.

(9) **Velcro straps.** Check all interior cables to ensure they are secured with velcro straps.

e. **Installation of Exterior Cables.**

(1) **W1 cable.**

(a) Connect W1 cable connector J2 to transceiver unit connector J2, at rear of transceiver unit.

Caution. Route cable on top of turret so it is protected from TOW launcher.

(b) Route W1 cable along left edge of turret top deck to target computer unit.
(c) Connect W1 cable connector J1 to target computer unit connector J1.

(2) **W5 cable.**

(a) Connect W5 cable connector J3 to target computer unit connector J3.
(b) Connector W5 cable connector J1 (short lead) to right-rear retro detector unit connector J1.
(c) Route long lead of W5 cable along right edge of turret top, to inside of antenna mount, to right-front retro detector unit. Connect W5 cable connector J1 to right-front retro detector unit connector J1.

(3) **W6 cable.**

(a) Connect W6 cable connector J4 to target computer unit connector J4.
(b) Secure target computer unit/rear retro detector assembly to turret center support by pushing down on locking handle.
(c) Connect W6 cable connector J1 (short lead) to left-rear retro detector unit connector J1.

Caution. Route cable on top of turret so it is protected from TOW launcher.

(d) Route long lead of W6 cable along left edge of turret top deck to left-front retro detector unit. Connect W6 cable connector J1 to left-front retro detector unit connector J1.

Caution. Damage could occur if cables are not properly routed and secured.

(4) **W12 cable.**

(a) Connect W12 cable connector J2 to RSI unit connector J2.
(b) Connect W12 cable connector J2 to target computer unit connector J2

(5) **Velcro straps.** Verify that velcro straps of cables both inside and outside of turret are properly installed to ensure cables are secure and do not cause a trip hazard for personnel.

f. **Verification of Installation.**

(1) Verify that all units are properly installed.
(2) Check that all cables are secured with velcro straps.

Caution. Ensure that no damage will occur to cables during gun elevation/depression or turret rotation.

4-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE (Con't).

(3) Check that cables are routed without loose ends and with only enough slack as is required for gun and turret movement.
(4) Check cable routing to ensure that no cable interferes with hatch operations.
(5) Check cable routing for potential trip hazards.
(6) Elevate and depress the gun manually to verify that no interior or exterior cables or assemblies can be damaged.
(7) Rotate the turret manually to verify that no interior or exterior cables or assemblies can be damaged.
(8) Ensure all on-board equipment is stored to prevent damage to cables and assemblies.
(9) Switch on vehicle master power.
(10) Switch on turret power.

4-3. TEST. (15 minutes/test)

Note. See Appendix B.

4-4. FINAL REVIEW. (5 minutes)

a. **Student Questions.**

Note. Show Slide 3.

b. **Summary of Main Teaching Points.**

(1) Installation of exterior components
(2) Installation of interior components
(3) Installation of interior cables
(4) Installation of exterior cables
(5) Verification of installation

Note. Show Slide 4.

c. **Closing Statement.** This block of instruction has taught you how to properly and safely install PGS on a BFV.

APPENDIX A
TO LESSON PLAN 4

INSTALLATION OF PGS

SAFETY

Listed general safety regulations are to be strictly enforced during the performance of this lesson.

1. Mount and dismount vehicle over left front or through the back ramp.
2. Maintain three points of contact while on top of vehicle.
3. No smoking within 50 m of vehicle.
4. Do not go over or under gun barrel.
5. LASER SAFETY: Do not view transceiver unit with optics from a distance of 25 m or closer.
6. Ensure turret traverse lock is engaged before entering turret or working in or around turret.
7. Ensure vehicle master power switch and turret power switch are set to OFF position when installing PGS.
8. No cables should be connected or disconnected by untrained personnel.

APPENDIX B
TO LESSON PLAN 4

INSTALLATION OF PGS

TEST ADMINISTRATION GUIDE

B-1. TASK.

Administer test, *Vehicle interface assembly connections.*

B-2. CONDITIONS.

Given a fully operational BFV with PGS installed except for selected vehicle interface assembly connections.

B-3. STANDARDS.

The crewman will correctly connect selected vehicle interface assembly connections to the BFV within 10 minutes.

B-4. PERSONNEL, EQUIPMENT, AND MATERIAL REQUIRED.

a. Evaluator (one per test station)
b. PGS set (one per test station)
c. BFV with BII (one per test station)
d. TM 9-2350-252-10-1/2 or TM 9-2350-284-10-1/2 (one set per test station)
e. TM 9-6920-710-12&P-1 (one copy per test station)
f. Scoring checklist of Appendix B (one copy for each crewman tested)

B-5. TEST PLANNING TIME.

Administrative time:	5 minutes
Test time:	10 minutes
TOTAL TIME (per crewman):	15 minutes

B-6. OTHER INFORMATION.

Before the crewman arrives, the evaluator will:

a. Install PGS on the BFV IAW TM 9-6920-710-12&P-1, Chapter 2.

B-6. OTHER INFORMATION (Con't).

b. Disconnect W9, W10, W11, and control panel cables, and remove TDRS memory card from control panel. Leave items on top of vehicle interface assembly for crewman prior to test.
c. Ensure TM 9-2350-252-10-1/2 or TM 9-2350-284-10-1/2 is available.
d. Ensure TM 9-6920-710-12&P-1 is available.
e. Have scoring checklist ready for crewman to be tested.

B-7. INSTRUCTIONS TO STUDENT.

"The purpose of this test is to determine your ability to correctly install the most critical component of PGS to the BFV. You will have 10 minutes to complete all steps. You must complete each step before beginning the next step. Your time will start when I announce 'BEGIN' and end when you announce 'FINISHED'. You may use TM 9-6920-710-12&P-1 during the test".

"Do you understand the requirements of this test?" (Answer questions)
"You may begin." (Start time)

VEHICLE INTERFACE ASSEMBLY CONNECTIONS

Scoring Checklist

NAME _____ UNIT _____

GRADE _____ DUTY POSITION _____

	GO	NO GO
1. Safety precautions prior to installation	_____	_____
a. Vehicle master power switch set to OFF position	_____	_____
b. Turret power switch set to OFF position	_____	_____
c. Turret traverse lock engaged	_____	_____
2. Did the soldier check DTP connectors for damage or dirt prior to installation or during installation?		
3. W10 cable connector J2 to DTP J2	_____	_____
4. W10 cable connector J1 to TPI J1	_____	_____
5. TPI vehicle cable connection to W10 cable	_____	_____
6. W9 cable connector J3 to DTP J3	_____	_____
7. W9 cable connector J4 to DTP J4	_____	_____
8. W11 cable installation	_____	_____
9. Control panel and TDRS memory card installation	_____	_____

	GO	NO GO	INITIALS
Soldier satisfactorily completed all requirements?	_____	_____	_____

EVALUATOR _____ DATE _____

REMARKS _____

APPENDIX C
TO LESSON PLAN 4

INSTALLATION OF PGS

VIEWGRAPHS